Habitat Quality and Selection of an Isolated Amphibian Population

Katrina Cook[1]

Anna Chalfoun[2] & Lusha Tronstad[3]

[1]Wyoming Cooperative Fish & Wildlife Research Unit
Department of Zoology & Physiology, University of Wyoming, Laramie, WY

[2]USGS, Wyoming Cooperative Fish & Wildlife Research Unit
Department of Zoology & Physiology, University of Wyoming, Laramie, WY

[3]Wyoming Natural Diversity Database, University of Wyoming, Laramie, WY

Contact: kwoods3@uwyo.edu

Global Amphibian Declines

- Disease & habitat degradation are major factors threatening amphibians' persistence worldwide
- Understanding habitat quality & selection of local populations is critical due to regional variation in habitat types & environmental conditions

Study Species & Distribution

- Both wood frog (*Lithobates sylvaticus*) populations in Wyoming are some of the most isolated in its range
- The fungal disease chytridiomycosis (*Bd*), is present in the Snowy Mtn. population

FIG 1. Distribution of the wood frog in orange, study area outlined in purple.

Little is known about:

- Wood frog habitat requirements in WY
- Amphibians' ability to reduce *Bd* infection via microhabitat selection
- Aquatic macroinvertebrates as indicators of amphibian breeding pond quality

Research Questions

Frog tracked to the base of a willow

1. What are the key habitat characteristics selected between stages and across spatial scales?
2. Do adults demonstrate habitat switching when infected?
3. Are aquatic invertebrate indices associated with successful development of early life stages?

Literature Cited

[1] Barrile, G. M., A. D. Chalfoun, and A. W. Walters. 2021 (Jan.). Infection status as the basis for habitat choices in a wild amphibian. American Naturalist. https://doi.org/10.1086/711927

Hypotheses

Wood frog peeking out

1. ***Stage-Dependent Habitat Selection:*** Microhabitat & pond-level characteristics selected will differ among the breeding, summer foraging, & overwintering stages.

2. ***Disease-Dependent Habitat Selection:*** Infected frogs will select warmer, drier microhabitats compared to uninfected frogs to clear infection[1].

3. ***Aquatic Invertebrates as Breeding Pond Quality Indices:*** High quality breeding ponds (with the highest number of egg masses and/or relative tadpole abundance) will:

↑ in densities of invertebrates sensitive to changes in water quality or environmental change

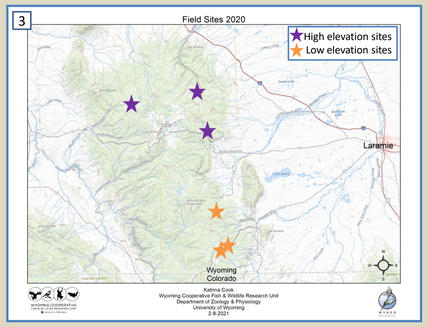
&

↓ in densities of invertebrates that function as amphibian predators or competitors for food resources

Study Area

FIG 2. Map of Wyoming, study area outline in purple

FIG 3. Study sites in the Snowy Mountains across elevations



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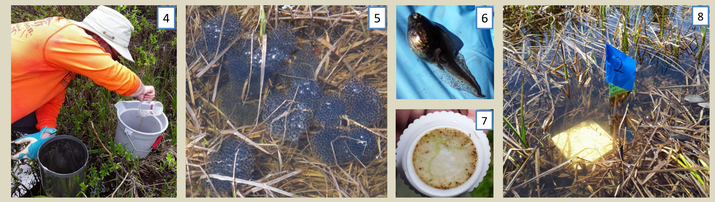
Methods

- Radio track 30-40 adult wood frogs weekly (May-Oct) & measure microhabitat characteristics at 5 sites
- Collect *Bd* sample at each frog's re-location
- Identify breeding & non-breeding pond condition by:
  - Sampling aquatic invertebrates (Fig 4)
  - Conducting egg mass counts & tadpole surveys (Fig 5 & 6)
  - Collecting algae samples (Fig 7 & 8)
  - Measuring water quality parameters



Preliminary Findings

- Longest distance moved: 133 meters
- On average, frogs moved ~20m/week
- Up to 135 egg masses counted at breeding ponds
- 23% of samples tested positive for *Bd*
- *Bd* status varied within & among individuals (Fig 9)

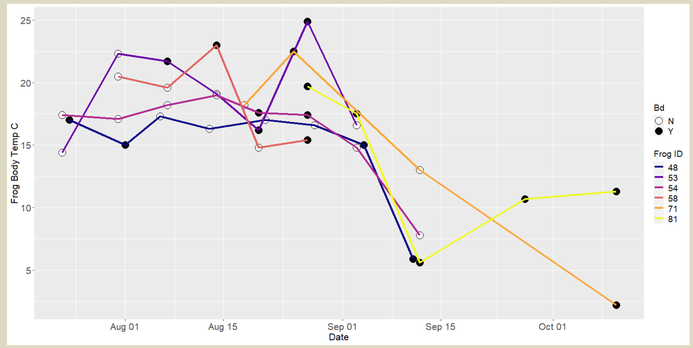


FIG 9. Plot showing variation in body temperature and *Bd* status within and among individuals over time.

Management Implications

- Prioritize management of key habitats selected for fulfilling life processes & microhabitats for clearing *Bd* infection
- Develop a cost-effective tool to assess quality of amphibian breeding ponds